

REMARKS

Claims 14-16, 18-25, 33-40, and 42-43 remain pending in this application.

Claims 34 and 35 have been canceled. Amendments to claims 14 and 25 were presented in Applicant's Response dated October 31, 2006. The Examiner refused to enter these amendments, stating that the amendment to claim 14 raised new issues. Although Applicants disagree that the amendment raised new issues, Applicants present for the Examiner's consideration the foregoing revised amendments to claims 14 and 25, in conjunction with a Request for Continued Examination. Applicants respectfully request entry of these amendments into the record.

In the Office Action dated May 31, 2006, the Examiner rejected claims 14-16, 18-25, 33-40, and 42 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner suggested that the terminology "initially predominantly coating the fibers of that fibrous structure preform with elemental carbon to impregnate that preform with elemental carbon" is unclear and should be substituted with "impregnating the preform with elemental carbon to initially predominantly coat the fibers of the fibrous structure." Applicants respectfully disagree with the Examiner's characterization of the current terminology as indefinite. However, to expedite the prosecution of this application, and believing the amendment to have no effect on the scope of the claims, the suggested amendments have been made. Therefore, Applicants respectfully request withdrawal of this rejection.

In the Advisory Action dated November 13, 2006, the Examiner requested clarification of the claim language requiring a silicon carbide grain size of "less than

about 10 microns.” The Examiner requested clarification as to whether this language refers to the all of the grains in the composite or to an average of all of the grain sizes in the composite. Applicants submit that the clarification the Examiner seeks is provided in Applicants’ specification, which states that “generally, no significant large crystals of SiC” are present in “the B₄C particulate systems of the present invention.” See Applicants’ specification, p. 26, par. [0107]; *see also* p. 13, par. [0055] (“[t]he presence of silicon carbide grains larger than 20 microns has been found to increase the wear rate of brake surfaces”); par. [0056] (“[i]t is believed that higher wear is due to the presence of large SiC grains”); p. 18, par. [0073] (“[p]ost test characterization revealed that large SiC grains . . . were likely responsible for the high wear rate”). In view of these and other statements in the specification, the maximum particle size limitation in the claims is intended to refer to substantially all of the silicon carbide particles present in the claimed composite.

The Examiner refused to enter into the record the Declaration of Thomas D. Nixon, Ph.D. that was submitted in connection with Applicants’ Amendment and Response dated October 31, 2006. Applicants are resubmitting the Declaration, along with a Request for Continued Examination, and request entry thereof into the record.

In the Office Action dated May 31, 2006, the Examiner rejected claims 14-16, 18-25, 33-40, 42 and 43 under 35 U.S.C. § 102(a or e) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 6,537,654 to Gruber et al (“Gruber”), for reasons of record. Having admitted that Gruber failed to teach the limitation to the silicon carbide grain size recited in Applicants’ claims, the Examiner nevertheless stated that “applicants have not shown by way of tangible

evidence that the grain size of the instant claims is outside that achieved by Gruber.” During a telephone conversation between the Examiner and the undersigned on August 7, 2006, the Examiner agreed that the results of testing, such as the testing described herein, showing a silicon carbide grain size outside Applicants’ claimed range, would “sound convincing” in overcoming the current rejection. Accordingly, Applicants submit herewith the “tangible evidence” that the Examiner seeks by way of a Declaration by Thomas D. Nixon, Ph.D.

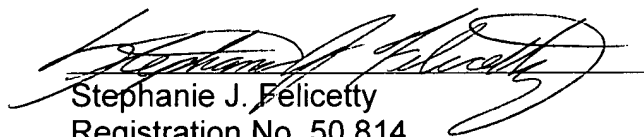
As stated in the Declaration, Dr. Nixon initiated an experiment to produce a sample according to the teachings of Gruber (a “Gruber sample”). See Nixon Declaration, ¶ 4. It was not possible to produce a sample entirely by the teachings of Gruber, given the limited disclosure of the Gruber reference. Consequently, Dr. Nixon coordinated the production of a “Gruber sample” by a process that, in many respects, used parameters disclosed in the present application. As such, the comparison would be more demanding. Nevertheless, Dr. Nixon’s experiment to produce a Gruber sample did follow, as closely as possible, the melt infiltration process taught by Gruber (see, e.g., Gruber, col. 15, Ins. 29-38). See Nixon Declaration, ¶ 9.

Analysis of the Gruber sample made by Dr. Nixon showed that the silicon carbide particles present were significantly larger than those recited in Applicants’ claims. See Nixon Declaration, ¶ 10. Specifically, the photomicrographs attached to the Nixon Declaration show silicon carbide particles greater than 50 microns. Therefore, the process disclosed in Gruber does not result in a product with a silicon carbide grain size of “less than about 20 microns,” as set forth in claim 14, or “less than about 10 microns,” as set forth in claims 25 and 43.

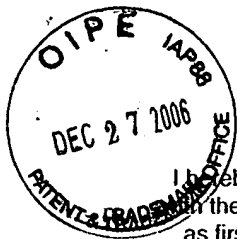
In summary, the Examiner acknowledged that Gruber fails to disclose the grain size of the silicon carbide in the Gruber material, and stated that Applicants have not shown by way of tangible evidence that the grain size of the instant claims is outside that achieved by Gruber. Applicants have now done so. The Declaration of Thomas D. Nixon, Ph.D. submitted with this Amendment and Response establishes that the Gruber material contains silicon carbide grains having a grain size outside the claimed range. Accordingly, the cited reference fails to teach or suggest a composite having all the limitations of Applicants' claims, and Applicants respectfully request that the § 102/103 rejection based on Gruber be withdrawn.

Applicants respectfully request that the subject application be deemed in condition for allowance. If, for any reason, the Examiner feels that the above amendments and remarks do not put the claims in condition for allowance, he is requested to contact the undersigned attorney at (312) 222-8105 to resolve any remaining issues.

Respectfully submitted,


Stephanie J. Felicetty
Registration No. 50,814
Attorney for Applicants

BRINKS HOFER GILSON & LIONE
P.O. Box 10395
Chicago, IL 60610
(312) 321-4200



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Stephanie J. Felicetty

Name of applicant, assignee or Registered Representative



Signature

10-31-06

Date of Signature

Case No. 4865/133 (202WB036)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: Nixon et al.	
Serial No.: 10/693,425	Examiner: Group, Karl E.
Filing Date: October 24, 2003	Group Art Unit No.: 1755
For: BORON CARBIDE BASED CERAMIC MATRIX COMPOSITES	

DECLARATION OF THOMAS D. NIXON, PH.D. UNDER 37 C.F.R. § 1.132

Mail Stop AF
Commissioner for Patents
Alexandria, VA 22313-1450

Dear Sir:

I, Thomas D. Nixon, do declare and state as follows:

1. I am one of the inventors in the subject patent application, Serial No. 10/693,425 ("Goodrich application"), and I am familiar with the contents of the application.

2. During the time that I contributed to the invention described and claimed in the Goodrich application and continuing to the present, I have been employed by the Goodrich Corporation, the assignee of the application.

3. I understand that the Examiner has rejected the subject application over U.S. Patent No. 6,537,654 ("Gruber"). I also understand that the Examiner has requested tangible evidence to show that following the teachings of Gruber produces a product with a silicon carbide grain size above the range specified in all of the claims of the Goodrich application.

4. In view of this request, I have attempted to duplicate the material disclosed in Gruber, i.e. to make a "Gruber sample." Unfortunately, the Gruber reference does not set forth every parameter needed to make the sample. Thus, in order to make the comparison more demanding, we used parameters from our own process described in the Goodrich application up to the point of the silicon melt infiltration. We then conducted the silicon melt infiltration step using the melt infiltration temperature set forth in Gruber. The details of the process we used to make the Gruber sample are set forth in the following paragraphs.

5. First, we started with a standard carbon fiber preform used in the commercial manufacture of Goodrich carbon/carbon aircraft brake products and having a fiber volume of about 23% to about 26% carbon.

6. Carbon was added to this preform by chemical vapor infiltration until the preform had a density in the range of about 1.25 g/cm³ to about 1.35 g/cm³. This

density range has been found to be acceptable for the invention disclosed in the Goodrich application.

7. A ceramic slurry of boron carbide having an average particle size of less than one micron (as used in the Goodrich invention) was then added to the material by a slurry casting process.

8. Next, the material was impregnated with liquid naphthalene, a liquid carbon precursor, as described in the Goodrich application.

9. The processing was completed using the silicon alloy melt infiltration temperature set forth in Gruber (see Gruber et al, Col. 15, ln. 36). In particular, we conducted the infiltration with liquid silicon under vacuum in a high temperature furnace. We used a temperature ramp profile that coincided with our furnace capabilities (approximately 0.5°C/min to 2.5°C/min) to achieve a melt infiltration temperature of approximately 1800°C, as set forth in Gruber. We found it necessary to add a 30 minute hold at 1500°C in order to prevent failure of the thermocouple used in the experiment. We held the sample at 1800°C for approximately 30 minutes. Finally, we allowed the sample to undergo uncontrolled cooling.

10. The resulting Gruber sample was characterized using optical microscopy. Copies of polarized light optical photomicrographs of the Gruber sample are attached at Tab 1. As can be seen in these photomicrographs, the Gruber sample contained many large silicon carbide particles having a grain size of greater than 50 microns. The photographs attached at Tab 1 are known to me to be true copies.

11. I declare that all statements made of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the above application or any patent granted therein.

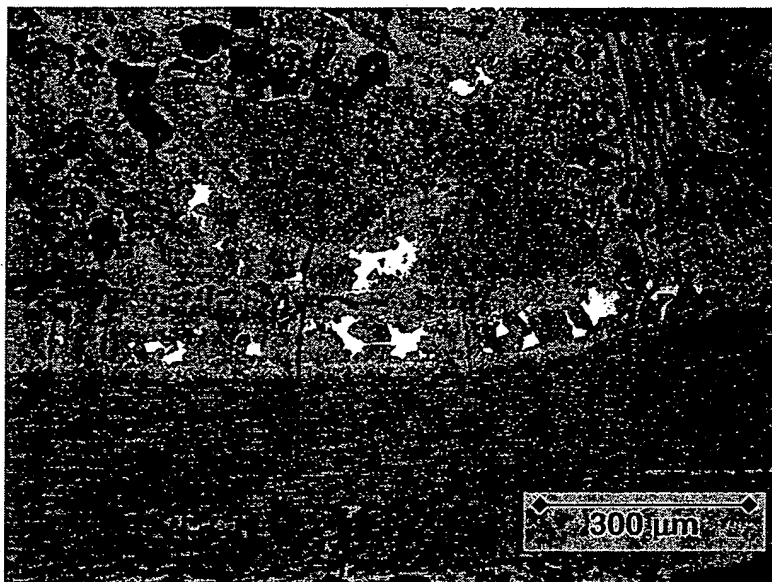
Dated: 10/31/2006

Thomas D. Nixon
Thomas D. Nixon

TAB 1



Gruber Sample
Low Magnification



Gruber Sample
Medium Magnification



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